

REMARKS

This application has been reviewed in light of the Office Action mailed March 4, 2008. Reconsideration of this application in view of the below remarks is respectfully requested. Claims 1 – 19 are pending in the application with Claims 1, 5 and 12 being in independent form. By the present amendment, Claims 1 – 19 are amended.

Claims 2 – 4, 6 – 11 and 13 – 19 are amended to correct informalities as described below. Claims 1, 5 and 12 are amended to clarify the structure of the puncture needle. Support for the amendment to Claims 1, 5 and 12 can be found throughout the disclosure as originally filed, for example FIG. 1a, 1b, 3a, 3b, 3c, 4 and 6a. Therefore, no new subject matter is introduced into the disclosure by way of the present amendment.

I. Objection to Claims 2 – 4, 6 – 11 and 13 – 19

Claims 2 – 4, 6 – 11 and 13 – 19 are rejected for reciting: “[A]n ultrasonic puncture needle...” in the preamble, where the Examiner contends that “[T]he ultrasonic puncture needle...” should be recited instead. While it is not believed that the preamble needs to be amended, for the purpose of advancing prosecution Claims 2 – 4, 6 – 11 and 13 – 19 have been amended as suggested by the Examiner.

Accordingly, Applicant respectfully requests withdrawal of the objection with respect to Claims 2 – 4, 6 – 11 and 13 – 19.

II. Rejection of Claims 1 – 19 Under 35 U.S.C. § 103(a)

Claims 1 – 19 are rejected under 35 U.S.C. § 103(a) as allegedly obvious over U.S. Patent No. 5,759,154 issued to Hoyns in view of U.S. Patent No. 6,238,336 issued to Ouchi and further in view of Japanese Publication No. JP 11-076254 (hereinafter, “Masatoshi”).

In the present invention, annular shaped recesses are provided from a back surface of the cutting-tip portion formed to have a smaller diameter in a tip-ward direction, to a predetermined range on the surface of the tip portion of the needle tube, which is an area excluding the cutting-tip portion. Therefore, the cutting-tip portion has no missing part caused by providing the annular-shaped recesses to the cutting-tip portion. Accordingly, the strength of the cutting-tip portion is not decreased.

In the claimed invention, there are provided a plurality of staggered-array annular-shaped recesses having flat surfaces on the bottoms and the sides. Therefore, when ultrasound is radiated from the ultrasonic transducer toward the tip portion of the needle tube to be incident thereon at a deep angle, that is, in a direction essentially orthogonal to the longitudinal axis of the needle tube, the ultrasound is reflected on the tip portion surface opposed to the ultrasonic transducer, the tip portion surfaces of the protrusions 5a, and bottom surfaces of the annular-shaped recesses, thus returning back in the incident direction. On the other hand, when the ultrasound is incident on the needle tube at a shallow angle in a direction other than the orthogonal direction, it is reflected on inside surfaces of the annular-shaped recesses opposed to the ultrasonic transducer and on outside surfaces of the protrusions, thus returning back in the incident direction. That is, by providing the annular-shaped recesses, the bottom surfaces, inside surfaces, as well as the outside surfaces of the protrusions serve as ultrasound reflecting surfaces. Accordingly, whether the ultrasound incident angle is deep or shallow, the ultrasound is reflected on the tip portion surface and the multiple surfaces, toward the ultrasound incident direction. In other words, the ultrasound image of the tip portion of the needle tube is clearly represented on the ultrasound observation image.

Ouchi teaches an ultrasonic endoscope including a sheath 100 to be inserted into a treatment tool insertion channel 13 of the ultrasonic endoscope, and a needle tube 101 to be punctured into the body cavity tissue through the sheath.

However, Ouchi fails to disclose or suggest a plurality of staggered-array annular-shaped recesses having flat surfaces on bottoms and sides thereof and provided from a back surface of the cutting tip portion near a tip of the needle tube to a predetermined range on a surface of a tip portion of the needle tube, which is an area excluding the cutting tip portion, as recited in Claim 1 and similarly in Claims 5 and 12.

Masatoshi teaches a needle tube for puncturing into a body cavity tissue, including a plurality of annular-shaped recesses provided on the tip portion surface of the needle tube. The specification of Masatoshi recites that “many annular-shaped recesses 30 are provided on the surface of the needle 5 as shown in Fig. 4, and the needle has a cross-section shaped with acute angles as shown in Fig. 5”.

However, Masatoshi does not disclose that annular-shaped recesses are provided from a back surface of the cutting-tip portion to a predetermined range on the surface of the tip portion as in the present invention. Therefore, when the cutting-tip portion back surface is opposed to the ultrasonic transducer at a shallow angle, the ultrasound is not returned in its incident direction.

Furthermore, in Masatoshi, since the annular-shaped recesses are formed to have cross-sections shaped with acute angles as shown in Fig. 5, when the ultrasound 33 radiated from the ultrasonic transducer 32 is reflected on the surface of the needle 5, many of the echo signals are reflect toward locations different from the radiating locations, as shown in the drawing. In other words, the ultrasound is not returned in the incident direction.

Hoyns discloses a needle 10 having a plurality of reflective structures formed on the tip portion. The needle 10 has a sharpened cutting portion formed by severing the tip portion of the shaft 11. That is, in Hoyns the sharpened cutting portion at the tip portion is formed by severing the tip portion of a shaft having a plurality of reflective structures formed thereon. In Hoyns, since the needle 10 has a solid structure, even if the dents are formed on the cutting portion, they would not conceivably result in deterioration of inherent functions of the needle, such as a decrease in needle strength.

However, if the tip portion of the needle tube recited in Applicant's claims is severed to form the sharp cutting-tip portion as in the manner of Hoyns, the annular-shaped recesses may be partly arranged on the cutting-tip portion, causing the cutting-tip portion to have missing parts or reduced thickness due to the annular-shaped recesses, decreasing the strength and increasing the risk of breaking or bending of the cutting-tip portion.

Therefore, for at least the reasons provided above, Claims 1 – 19 are believed to be allowable over the cited prior art references. Accordingly, Applicant respectfully requests withdrawal of the rejection with respect to Claims 1 – 19 under 35 U.S.C. § 103(a) over Hoyns in view of Ouchi and further in view of Masatoshi.

CONCLUSIONS

In view of the foregoing amendments and remarks, it is respectfully submitted that all claims presently pending in the application, namely, Claims 1 – 19 are believed to be in condition for allowance and patentably distinguishable over the art of record.

If the Examiner should have any questions concerning this communication or feels that an interview would be helpful, the Examiner is requested to call Applicant's undersigned attorney at the number indicated below.

Respectfully submitted,



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